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ABSTRACT

The Teaching Information Processing System (TIPS), a computer-augmented instructional aid, provides individualized instruction for large numbers of students. The TIPS procedure involves the following: (1) instructor preparation of a detailed course outline; (2) delineation of course concept areas and objectives; (3) creation and weekly administration to students of TIPS surveys of multiple-choice questions sampling learning achievement; (4) creation of decision rules for question groupings in order to prescribe individualized assignments; (5) computer coding of survey answer key, concept areas, decision rules, and prescriptions; (6) instructor feedback to student assignments; and (7) administration of hour-long examinations. An evaluation of TIPS' effectiveness was demonstrated by a 10% improvement in the average score of students using the system. Though both high and low ability students were seen to benefit, underachieving students typically benefited more. Student reaction to TIPS was also favorable. Though the costs of implementing TIPS--which include computer time and salaries of teacher assistants and readers--are considerable, and though the expenditure of instructors' time was greater than expected, these factors must be balanced against the ability of instructors to handle larger numbers of students and the incremental learning gain of these students. Appendices illustrate aspects of TIPS. (MB)

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'TIPS' IN A COMMUNITY COLLEGE SETTING

by

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Riverside City College

for presentation at the symposium for
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"Innovations in Teaching the Introductory Course"

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A COMMUNITY COLLEGE SETTING

I am a faculty member at a medium-size (13,000 student) comprehensive community college serving a diverse and growing area east of Los Angeles, California. Our open-door admissions policy and diverse post-secondary educational programs attract a heterogeneous student clientele typical of most California community colleges.

Student Characteristics

Our student population is almost equally divided between day students and extended-day (or evening) students. Over half of our day students indicate an intention to transfer to four-year institutions. Some seventy percent of these day students are less than 26 years of age. Four out of five day students carry less than 15 semester units of classes.

Extended-day students are older (sixty percent are age 26 or over) and less committed to college. Over eighty percent of extended-day students currently take 6 units or less per semester. Only one of three from this group declare a transfer intention.

Entering student test scores are used to counsel students. All scholastic ability levels are represented at our college, but student verbal and mathematical ability scores are skewed toward the low end of the scales when compared with national norms. In recent years, not only have indices of college ability generally declined, but attractive jobs and recruitment offers by four-year colleges have lured away many of our traditional students. At the same time, non-traditional student groups are entering (or re-entering) college under governmental programs, and as a part of continuing education.

California Community Colleges

Over 100 community colleges in populous California serve twice as many students as all other colleges and universities in the state. In California, we are faced with the aftermath of Proposition 13. As a practical matter, this has entailed a property tax cut at the local governmental level, and a partial shift of community college funding to state sources.

Our politically ambitious governor has decreed that our 1978-79 budgets be pared to 85 percent of the previous year's level. The 1979-80 budgets will be slimmed down by an additional 10 percent. There are many possible responses, but fewer classes and instructors are probable outcomes.

The Instructional Problem

A likely increase in the student/faculty ratio, a heterogeneous student population, and a student clientele with poor study skills--all add up to a knotty instructional problem. Ideally, a heterogeneous student population calls for individualized instruction. A student clientele with poor study skills calls for remediation built right into the courses being taught. But how can such methods be employed when the instructor is responsible for large numbers of students?

TEACHING INFORMATION PROCESSING SYSTEM

One way of providing quality individualized instruction for large numbers of students is to utilize TIPS (Teaching Information Processing System) developed by Professor Allen C. Kelley of Duke University. TIPS is a pedagogically sound procedure which has been computer augmented to handle large numbers of students. TIPS is not

a cybernetic replacement for instructors. Neither is it a professorial surrogate. TIPS merely makes possible the individualized monitoring, feedback, and remediation which a competent educator and subject-matter expert can use to effectively move large numbers of students toward specific learning objectives.

The TIPS Procedure

Following orientation to TIPS, the instructor must prepare a detailed course outline. Such an outline should include week-by-week dates, lecture topics, reading assignments, due dates for homework, survey and examination dates, and any special events (field trips, holidays, and special presentations) that may be scheduled in advance. TIPS assisted courses must be tightly planned and structured. These course outlines are distributed to students. A sample outline is included as Appendix A.

Concept Areas and Objectives. In addition, the instructor should entitle each instructional unit within the course, and each concept area within each instructional unit. Within each concept area, it is extremely useful to write fairly definite learning objectives. These objectives guide instruction, act as a guide to selecting TIPS survey questions, and serve as a means of prescribing student assignments. Sample learning objectives are included as Appendix B.

Survey Questions. TIPS surveys of ten to twenty multiple-choice questions must be compiled to sample learning achievement in each concept area. Typically, 3 to 5 questions per concept area are necessary to give a reading on the extent of cognitive learning. A sample of TIPS survey is included as Appendix C.

Adequacy criteria of acceptable performance should also be

established. For example, if a concept or skill is essential in understanding subsequent course material, then 100% correct responses on concept survey items might be desirable. More typically, however, 90 to 100% performance may be defined as exemplary, 75 to 90% performances may be indicative of needed brush-up work, and below 75% performance may indicate a need for remediation.

Decision Rules. Based upon the established adequacy criteria, decision rules for each question grouping (testing for concept area mastery) must be created in order to prescribe pertinent, individualized assignments. These prescriptions may vary from no assignment indicated, to optional brush-up assignments, to required remedial assignments for poorly performing students. Prescriptions may also vary according to individual student characteristics. The three to five sets of decision rules and prescriptions per survey are the key to monitoring student progress and tailoring assignments to the individual student. Sample decision rules and prescriptions are included as Appendix D.

Computer Coding

Once the course is planned in detail, a TIPS assistant is necessary to code the survey answer key, content/concept areas, decision rules, and prescriptions into a form suitable for TIPS computer program requirements. A TIPS assistant is a near necessity to facilitate the care, feeding, and burping of TIPS. We used an exceptionally competent student in that role. Most community college instructors will not have such help available.

TIPS Surveys

Almost weekly, TIPS surveys were administered to students. Student answers were keypunched and submitted for processing. We used

the IBM 360/50 located on the nearby U.C. Riverside campus for production runs. CPU (region=200K) time was always within the 2-4 minute range. Subsequently, our college has upgraded its Burroughs Mod 1700 computer. Production runs may now be accomplished on campus in about 15 minutes of run time.

Each student received a printout detailing his performance on the survey. Along with the student's item analysis were printed the prescriptions designed to strengthen those areas where the student showed weakness. No student was required to do "busywork." As much as possible, each student was given an assignment tailored to his individual deficiencies and strengths. Sample student "progress report" printouts are shown in Appendices E, F, and G.

Students with no required assignments were given automatic points toward course grade determination. Other students who were given remedial prescriptions or standard (no survey) assignments received full point credit provided that they complete their particular assignments satisfactorily. Assignments ranged from specific problems in the textbook, to study guide questions, to self-instructional units with post-tests, to interactive computer exercises, to instructor supplied exercises.

Instructor Feedback

Without reader assistance, all of the individual student assignments must be evaluated by the instructor. We remember reading one student assignment where the phrase, "You don't really read all of this stuff, do you?" was inserted. (The answer was, "Yes!") The time commitment is substantial. But without meaningfully appropriate assignments which are monitored by the instructor for grading purposes, the remediation feature of TIPS is of little value.

In addition to student work, the instructor receives detailed reports on each survey including an item analysis broken down by student and by class, and which diagnostic messages were printed for each student. Such information is useful in preparing a remedial lecture or for redesigning some portion of a course. One such summary report generated by the TIPS program is included as Appendix H.

Finally, cumulative performance statistics on TIPS surveys can alert the instructor to students experiencing unusual difficulties. A special "all points bulletin" can be generated on TIPS reports requesting that such students see their instructor for counseling. Similarly, students performing exceptionally well on TIPS surveys may be excused from examinations by way of special messages.

Examinations

Four hour-long examinations were given during the semester. Multiple-choice examination questions were carefully selected to elicit a representative sampling of cognitive abilities in all concept areas. Questions on examinations were not identical or similar to survey questions. The TIPS procedures were not used as a means of teaching to a test. Rather, TIPS was used to facilitate content mastery.

In addition to the four examinations, one form of the Test of Understanding in College Economics (TUCE) was used to independently assess course effectiveness. The TUCE is not a criterion referenced achievement test. Rather, it is a research instrument with high difficulty and discrimination indices.

EVALUATION OF EFFECTIVENESS

The approach used to statistically evaluate the effectiveness

of TIPS was multiple regression analysis. All available factors which might affect student performance are included in a predictive equation. The hypothesis to be tested is simply whether the regression coefficient of the TIPS variable is positive and significantly different from zero at the 0.05 level. By holding "other things constant," the separate effect of the TIPS innovation on student achievement is revealed.

The two dependent variables selected were the average score on the four achievement tests, and the TUCE score. These are the variables to be "explained" by the independent variables.

The independent variables selected were continuous or dichotomous variables presumed to affect learning or predict achievement as follows:

1. CONS -- a constant (=1) which picks up the mean value of the dependent variable. This allows other independent variables to explain variation about the mean.

2. SCAT -- total score on the School and College Ability Test. The expected sign of the regression coefficient for this variable is positive, meaning the higher the student's SCAT score the better he should perform on economics examinations. The mean SCAT score was 296.9 for all students.

3. GPA -- previous grade point average at Riverside City College. Highly motivated students with good study skills should perform better on economics examinations than students who are unmotivated or have poor study skills. The expected sign of the regression coefficient is therefore positive. (The simple correlation coefficient between SCAT and GPA is +0.46. While this limits the usefulness of interpreting the respective regression coefficients and standard errors

for these two variables, multicollinearity is not a serious problem.) The mean previous GPA was 2.75 for all students.

4. SEX -- a dichotomous variable indicative of student gender (0 = male, 1 = female). Previous research in economics education has sometimes indicated that females do not do as well in economics as males. The expected sign of the regression coefficient is therefore negative. Some 27% of the students in this study were female.

5. ETHNIC -- a dichotomous variable designating the student as Black, or with a Mexican American/Chicano/Spanish surname (0 = caucasian, 1 = minority). If minorities (on average) come from educationally disadvantaged backgrounds, the expected sign of the regression coefficient is negative. Some 14% of the students in this study were from ethnic minority backgrounds.

6. AGE -- chronological age as of June 1977. Older and more mature students are generally more serious, and have learned from experience. The expected sign of the regression coefficient is therefore positive. The mean age of students in this study was 23 years.

7. MS -- a dichotomous variable designating the student's marital status (1 = married, 0 = single, separated, divorced, or widowed). Married students are often more settled and less prone to dissipation. The expected sign of the regression coefficient is positive. Some 21% of the students in this study were married.

8. TRANS -- a dichotomous variable indicating that the student has declared that he or she wishes to transfer to a four-year institution (1 = transfer intention, 0 = unsure, or had vocational, general education, certificate, or job skill objective). Of the students in this study, 45% had indicated transfer intention as their

educational goal. The expected sign of the regression coefficient is positive since four-year colleges have admission standards which students must meet.

9. BSMAJ -- a dichotomous variable indicating whether the student is a business major (1 = business major, 0 = other or undeclared). It is common for economic concepts to be included in business courses. The expected sign of the regression coefficient is therefore positive. Some 39% of the students in this study were business majors.

10. TIPS -- a dichotomous variable designating whether the student was in experimental TIPS classes, or in the control group (1 = TIPS, 0 = control). Of the students in this study 80% were enrolled in one of the two experimental TIPS classes. The expected sign of the regression coefficient is positive.

Table 1 represents the regression results generated when the examination average was regressed on the ten independent variables.

TABLE 1

ACHIEVEMENT TEST REGRESSION RESULTS

Dependent Variable: EXAM AVERAGE
(mean of dependent variable = 70.15)

	Independent Variable	Estimated Coefficient	Standard Error	T-Statistic
1.	CONS	-96.52	24.52	-3.94*
2.	SCAT	+ 0.49	0.09	+5.70*
3.	GPA	+ 7.45	1.87	+3.98*
4.	SEX	- 4.16	2.27	-1.84
5.	ETHNIC	- 1.20	3.18	-0.38
6.	AGE	- 0.08	0.21	-0.40
7.	MS	+ 1.21	3.51	+0.35
8.	TRANS	+ 1.96	2.14	+0.92
9.	BSMAJ	- 2.93	2.19	-1.34
10.	TIPS	+ 6.72	2.79	+2.41*

Number of Observations: N = 80

Coefficient of Multiple Determination: R^2 = 0.51

Standard Error of the Regression: S.E. = 8.57

(* indicates that the coefficient is significant at the 0.05 level)

The TIPS coefficient indicates that, holding all other factors constant, TIPS raised student performance on examinations by an average of 6.7 points. This represents a 10% improvement in the average examination score by students using TIPS. This improvement is statiscally significant. The R^2 statistic indicates that 61% of the total variation of the dependent variable was explained by the independent variables.

Table 2 presents the regression results generated when TUCE scores were regressed on the ten independent variables. The TUCE contains questions involving recognition and understanding, simple application, and complex applications. The national norm for this test (posttest no pretest) for Form I-A is a mean of 58.1% correct with a standard deviation of 16.3.

TABLE 2

STANDARD TEST REGRESSION RESULTS

Dependent Variable: TUCE I-A Percent Correct
(mean of dependent variable = 59.63)

	Independent Variable	Estimated Coefficient	Standard Error	T-Statistic
1.	CONS	-186.83	39.54	-4.73*
2.	SCAT	+ 0.75	0.14	+5.43*
3.	GPA	+ 8.78	3.02	+2.90*
4.	SEX	- 9.16	3.65	-2.51*
5.	ETHNIC	+ 0.47	5.12	+0.09
6.	AGE	+ 0.15	0.34	+0.43
7.	MS	- 1.88	5.66	-0.33
8.	TRANS	+ 1.01	3.45	+0.29
9.	BSMAJ	- 2.49	3.53	-0.70
10.	TIPS	+ 1.01	4.50	+0.22

Number of Observations: N = 80

Coefficient of Multiple Determination: $R^2 = 0.52$

Standard Error of the Regression: S.E. = 13.82

(* indicates that the coefficient is significant at the 0.05 level)

Briefly, the use of TIPS raised the scores of students taking the TUCE by 1 point (holding all other factors constant. This repre-

sents a 2% improvement in average TUCE test scores resulting from the use of TIPS. TIPS did not contribute significantly to higher scores on this standardized test.

Distribution of Benefits

TIPS encourages a highly structured course, distributed learning, and remediation. It is to be expected that a TIPS course would benefit less able students relatively more than capable students. This is verified by the findings summarized in Table 3. In every case, high ability and low ability students benefit from TIPS. But the low ability, underachieving student typically benefits more -- both absolutely and relatively.

TABLE 3

DISTRIBUTION OF STUDENT BENEFITS

Predicted Achievement Scores of Student Subgroups

	TIPS Classes (Mean Exam Score=71.8)	Control Class (Mean Exam Score=63.5)	Difference
By Previous Academic Performance			
High GPA	87.2	73.8	13.4
Low GPA	66.8	51.1	15.7
By Scholastic Ability			
High SCAT	82.7	79.3	3.4
Low SCAT	61.6	49.0	12.6
By Motivation			
High Achiever	77.7	75.4	2.3
Low Achiever	69.0	53.7	15.3

Explanation of terms used above:

High GPA 3.38 plus
Low GPA 2.12 or less

High SCAT 310.3 plus
Low SCAT 283.5 or less

[Table 3 is continued on the next page.]

High Achiever: below 310.3 SCAT but 3.38 or above GPA
Low Achiever: above 283.5 SCAT but 2.12 or less GPA

Factors Held Constant in Above Comparisons:

SEX	MS
ETHNIC	TRANS
AGE	BSMAJ

There are several explanations of the distributional benefits in evidence in Table 3. High ability, high achieving students are no doubt running into the "ceiling effect" of the maximum possible score (100%) on the examinations. For example, it is more difficult to improve a score from 90% to 95% than it is to improve on a score of 60%. Additionally, some students used TIPS to obtain a desired grade rather than attempting to maximize their exam scores. By removing uncertainty and providing feedback to the student, TIPS enabled some students to substitute work in other subjects or leisure for time otherwise spent in studying economics. The "satisficing" model may be a more appropriate way of explaining this type of student behavior.

Student Opinion

Student reaction to TIPS was favorable. On a standard "Student Appraisal of Instruction" form, students were asked to indicate their opinion of TIPS. Some 56% of the responses were highly favorable to TIPS, while only 6% expressed unfavorable sentiments. The remaining 38% of the students were either neutral on the subject, or expressed no opinion.

Sample comments:

> "The TIPS method is highly productive. It forces one to keep on top of the course, and at the same time it eliminates busywork."

"The TIPS system was highly effective because the assignments were concentrated in my weak areas."

"TIPS was good. It made me open the book each week instead of letting it pile up."

"TIPS shows you what you do and don't know."

"TIPS surveys encouraged (coerced?) reading and understanding of course material."

"I feel that the TIPS surveys are more work than they are worth."

COSTS OF IMPLEMENTING TIPS

TIPS enables the instructor to handle large numbers of students on an individualized basis. Because of refinement in the instructional process abetted by TIPS, course standards may be maintained and the learning of difficult material significantly improved. Whether the incremental gain in learning achievement by students is worth the incremental cost of resources necessary to achieve that gain, is a question worth considering. In economic education, as elsewhere, there is no free lunch.

Instructor Time

The expenditure of instructor time on the project exceeded anticipated requirements. Part of the required time is of a nonrecurring nature inherent in any pilot project or in any detailed instructional procedure being tried for the first time.

TABLE 4

INSTRUCTOR TIME COMMITMENT

TASK	TIME REQUIRED
Workshop (instructor training)	3 days or 24 hours
Learning Objectives	
2 hours per unit x 14 units	3.5 days or 28 hours
TIPS Surveys	
1 to 2 hours per unit x 14 units	2.6 days or 21 hours
Decision Rules and Prescriptions	
2 hours per unit x 14 units	3.5 days or 28 hours
Supervision of TIPS Assistant	
1 hour per unit x 14 units	1.75 days or 14 hours
Grading of TIPS Assignments	
4 hours per unit x 14 units (approximately 90 students)	7 days or 56 hours
Total Tasks	21 days or 171 hours

There were many miscellaneous problems, delays, and minor emergencies which required additional instructor time and energy. It can safely be said that TIPS is not a substitute for the labor of the instructor. TIPS is a complementary resource to be used in conjunction with the energies and abilities of a conscientious teacher. Were it not for the good fortune of a very capable TIPS Assistant, the time commitment required could have easily been doubled.

Once a TIPS course has been created, instructor time required should drop to approximately six hours per week for each class preparation. Given an experienced TIPS assistant and reader help, instructor time commitment could be reduced to two hours per week of supervision, maintenance, and revision.

Computer Costs

Computer time purchased off-campus amounted to about $4.00/ student for the initial implementation (including the debugging of our prepared input). All computer time was purchased at prime time (expensive) rates. I would anticipate that properly debugged input together with off-hours processing could reduce the above figure by 50 to 75 percent.

If you have an on-campus computer which is presently under-utilized, the marginal costs of processing TIPS become negligible. All you have to do is convince the college business manager of the efficacy of marginal cost pricing.

Assistance for the Instructor

If an instructor is going to use TIPS, he requires the help of a TIPS assistant (to handle the care and feeding of TIPS) and reader help (to expedite the grading of assignments for large numbers of students). Otherwise, TIPS becomes an unendurable drain on instructor energy and time. Most teachers (even conscientious ones) will not use TIPS under these conditions.

In implementing TIPS at our college, we used 10 hours of TIPS assistant time per week for typing, coding, keypunching, submitting and picking up jobs at the computer center, distributing printouts, and keeping a detailed record of the TIPS implementation on a week-by-week basis. I would recommend no less assistance to anyone else wishing to use TIPS for the first time.

A reader (for written work) or a grader (for simple fill-in or objective questions) are necessary to help the instructor wade through the large number of individualized homework assignments which are produced as a result of the learning prescriptions generated through

TIPS. Failure to require assigned remediation, evaluate student work, and reward those students who complete their assignments satisfactorily is tantamount to gutting the TIPS procedure. Yet the conscientious instructor will find evenings and weekends filled with hundreds of papers unless some assistance is available. Continued effort of this type in addition to a heavy teaching load and other duties can serve as adequate preparation for a position with Funny Farm State.

The costs of implementing TIPS are substantial. If you do not have adequate computer facilities, a TIPS assistant, and some reader help, then use your discretion. Not every increment of learning is worth its cost -- especially if those costs are primarily and inordinately borne by the instructor.

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APPENDICES

APPENDICES

A. Course Outline/Schedule

B. Unit I. Learning Objectives

C. TIPS Survey No. 1

D. Sample Decision Rules and Prescriptions for Survey 1

E. Student Progress Report (Noshow, Joe)

F. Student Progress Report (Nostudy, Nevelle)

G. Student Progress Report (Sharpe, Student)

H. Professor's Summary Report for Survey 1

Appendix A, containing a Course Outline/Schedule for "Principles of Macroeconomics," was removed from the document prior to its being submitted to the ERIC Document Reproduction Service.

Appendix B

LEARNING OBJECTIVES

UNIT I. Basic Economic Concepts

1. Knowledge of Terms and Definitions

1.1 Identify the domain of economics as scarcity: expansive wants and limited resources.

1.2 Distinguish between microeconomics and macroeconomics by the level of aggregation used in analysis.

1.3 Recognition of economic activity as being composed of production, exchange, distribution, and consumption of goods and services.

1.4 Identify or define the four categories of economic resources.

1.5 List the three principal functions that any economic system must perform.

1.6 Enumerate three reasons for studying economics.

2. Economic Methodology

2.1 Explain the scientific method consisting of the processes of induction, deduction, and empirical verification.

2.2 Define economic theories.

2.3 Distinguish between economic theories, principles, and laws as a progression towards confidence in veracity.

2.4 Define a model as used in economics.

2.5 Identify the purposes of a model.

2.6 Distinguish between errors of omission and errors of comission.

2.7 Recognize geometric models as being mechanical analogs of mathematical models.

3. Graphical Analysis

3.1 Distinguish between dependent and independent variables.

3.2 Given a verbal statement of economic theory, express the statement numerically, mathematically, and graphically.

3.3 Given necessary data involving one dependent and one independent variable, graph the relationship and identify the slope of the line connecting the points as positive or negative.

3.4 Given a point, identify the (x,y) coordinates.

3.5 When shown graphical relationships, distinguish between direct, inverse, constant, or no relationship.

3.6 Calculate the slope of a graphed linear function.

3.7 Given a graphed, twice differentiable function, identify the value of the independent variable at which the dependent variable reaches a maxima or minima.

3.8 With a twice differentiable graphed function, distinguish between increasing or decreasing rates of change.

4. Pitfalls and Fallacies in Economics

4.1 Given a set of statements, select the statement exhibiting the least bias or special pleading.

4.2 Select a term which has different meanings in popular and economic usage.

4.3 Given statements exemplifying the following fallacy types, identify the fallacy of: false cause, appeal to the people, appeal to authority, composition, or division.

4.4 Recognize a situation where rumor or prediction elicits collective behavior indicative of a self-fulfilling prophecy.

5. Economics and Economic Policy

5.1 Define positive and normative economics.

5.2 Given examples, distinguish between normative and positive statements.

5.3 Given two conflicting statements in economics, determine whether the conflict or issue may be resolved by appeal to fact.

5.4 Identify the elements of economic policy and the role of the economist (as economist) in analyzing policy issues.

5.5 Select situations which most clearly represent conflicts among stated economic goals.

5.6 Recognize the unlikely prospect of maximizing "benefits" and minimizing "detriments" simultaneously.

5.7 Identify situations where the "optimum" policy involves a trade-off between desirable alternatives.

Appendix C

Principles of Macroeconomics, Spring 1977, Dr. Thompson
TIPS Survey No. 1
Use the special answer sheet provided.

1. Economics is that social science concerned most generally with how:
   1) the government raises the taxes required for its activities
   2) businesses are managed under profit incentives
   3) society uses resources which are scarce relative to collective needs and desires
   4) stocks and bonds are bought and sold in securities markets

2. In macroeconomics, we would most probably analyze the:
   1) pricing and output decisions of a business firm
   2) exportation of wheat and the effect on the domestic price of bread
   3) total output, employment, income, and price level of the economy
   4) predicted effect of the production of synthetic food on agriculture

3. Economists sometimes classify economic resources into four basic categories called:
   1) capital, labor, land, and mineral deposits
   2) money, real and personal property, labor services, and stocks
   3) human resources, natural resources, capital goods, and entrepreneurship
   4) government resources, household resources, business resources, and labor resources

4. The principal functions of any economic system are to determine:
   1) who shall produce goods and services; what goods and services shall be produced; where will they be produced?
   2) what goods and services shall be produced; how shall they be produced; how shall these goods and services be distributed?
   3) who shall produce goods and services; how many shall be produced; how much shall these goods and services cost?
   4) what goods and services shall be produced; how many shall be produced; how shall they be produced?

5. The scientific method consists of the processes of:
   1) induction, deduction, and empirical verification
   2) hypothesis, theories, and laws
   3) theories, models, and graphs
   4) facts, conjectures, and opinions

6. An economic theory:
   1) is an abstract meaningful statement about complex phenomena
   2) will seldom (if ever) be wrong as a framework for analysis
   3) is really the same as a fact since for practical purposes the two are interchangeable
   4) is useful for organizing information according to the value systems of economists

7. An economic model is a(n):
   1) simplified framework for analysis
   2) attempt to replicate the real world
   3) useful device for generating data not readily observed
   4) mathematical statement with little relationship to reality

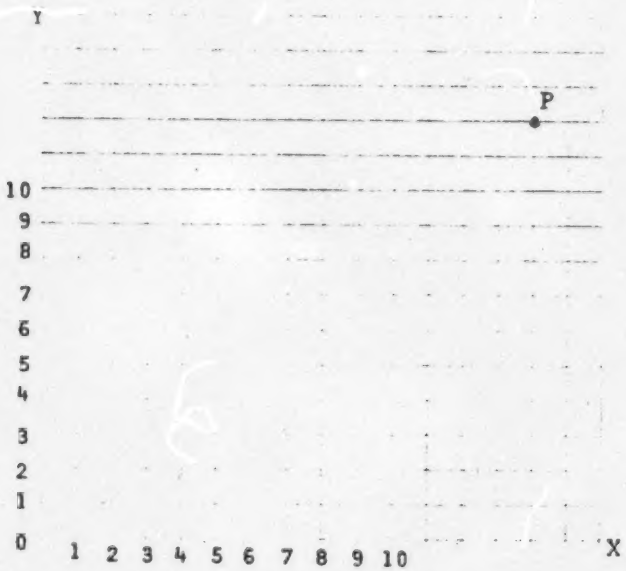
8. The equation y = 2x may be visually expressed by:
   1) a graph
   2) differentiation
   3) a mechanical model
   4) flow diagram

9. "During 1974 there was a substantial net outflow of financial resources from large oil-consuming nations to oil-producing nations. The situation was attributed to increases in the price of oil by oil-producing nations."

   In the above statement, the net outflow of financial resources is the ____ variable, and the price of oil is the ____ variable.

   1) independent, dependent
   2) dependent, independent
   3) independent, independent
   4) dependent, dependent

Use the following graph in answering questions 10 and 11:



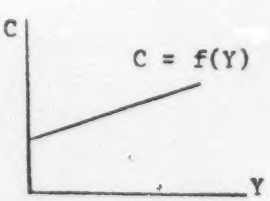
10.

y	x
0	0
1	1
4	2
9	3

Graph the relationship between y and x from the preceding data. The slope of the line connecting the points is:
   1) positive
   2) negative
   3) zero
   4) infinite

11. The (x, y) coordinates of point "P" on the preceding graph are:
   1) (11, 10)
   2) (14, 12)
   3) (13, 11)
   4) (12, 12)

12. The relationship depicted between variables C and Y is:
   1) inverse
   2) direct
   3) constant
   4) no relationship apparent



13. From the statements below, select the one which shows the least bias:
    1) under capitalism, the rich get richer, the poor get poorer; but under socialism income is more equally distributed, because of common ownership of production
    2) fundamental differences in property relationships exist between the United States and the Soviet Union; where, for the former, private ownership prevails: for the latter, public ownership prevails
    3) the Soviet Union is a godless, economic tyranny
    4) monopoly capitalists in the United States exploit the working class

14. Which of the following terms has a distinct meaning in economics which differs from popular usage?
    1) capital
    2) price
    3) output
    4) fallacy

15. Which of the following statements illustrates the fallacy of composition?
    1) investment is popularly thought of as money placed in bonds, stocks, etc., while to economists it means net additions to a nation's productive capacity
    2) people rush to sell G.E. stock in anticipation of a fall in price, thus causing the price to fall
    3) decreases in the rate of interest usually precede increases in home building; the interest fell yesterday; therefore, home building will necessarily increase
    4) "What's good for General Motors is good for the United States"

16. In a certain country there were rumors that a depression was coming and that unemployment would increase. The citizens began to save more of their income as a precaution. This caused sales to decline and many businesses had to lay off employees. This is an example of which of the following?
    1) a post hoc, ergo propter hoc situation
    2) fallacy of composition
    3) conflicting economic goals
    4) self-fulfilling prophecy

17. A positive economic statement can often be distinguished from a normative statement by:
    1) debating the issue
    2) appeal to factual evidence
    3) considering the worth of values
    4) a statement of opinion

18. Mr. J.C.: (I) "Unemployment is at an alltime high.
    (II) Therefore, government must pursue new policies to reduce unemployment."
    Mr. J.F.: (III) "Employment is at a record high and is increasing.
    (IV) Existing policies are moving the country in the right direction."

    Which parts of the conflict preceding statements by Mr. J.C. and Mr. J.F. may be resolved by appeal to fact?
    1) (I) and (II)
    2) (III) and (IV)
    3) (I) and (III)
    4) (II) and (IV)

19. Which of the following statements approximates the role of the economist in analyzing policy issues?
    1) "We must be good and just in satisfying our people's needs."
    2) "A $50-billion increase in government spending for this purpose would lower unemployment by 0.1 percent."
    3) "We have been paying too much attention to full employment and not enough attention to inflation."
    4) "The number-one domestic priority in this country ought to be education."

20. Which of the following statements correctly depicts the trade-off dilemma in policy-making?
    1) With an optimal mix of policies, all goals may be achieved simultaneously.
    2) Actions undertaken to attain one economic goal may hinder the attainment of another goal.
    3) By pursuing one objective, we simultaneously achieve another objective as a result of achieving the first.
    4) Among special interest groups, there is no necessary conflict when their goals are parallel.

Appendix D

SAMPLE DECISION RULES AND PRESCRIPTIONS FOR SURVEY 1

General Instructions to the Student: All written assignments are to be handed in for grading at the class meeting of Wednesday, February 9.

Concept Area 1: Knowledge of Terms and Definitions

Question Grouping 1: Questions 1-4
Each question weighted equally.

1. Decision Rule: Students whose score on Grouping 1 is 75% or above.

   Prescription: You have a good grasp of basic economic concepts. Be sure to review using your Study Guide prior to the first examination. (Optional)

2. Decision Rule: Students whose score on Grouping 1 is from 50 through 75%.

   Prescription: Write out the definitions of the first four terms listed on page 11 of your textbook (1. Terms and Concepts to Review:). Explain the specific meaning of "scarcity" and "economizing" in economics.

3. Decision Rule: Students whose score on Grouping 1 is less than 50%.

   Prescription: Answer true-false questions nos. 1, 2, 9 on pages 5 and 6 of your Study Guide. Also answer true-false questions nos. 1, 2, 6, 9, 10, 11 on page 12. For each question, state briefly why the statement is true or false.

Concept Area 2: Economic Methodology

Question Grouping 2: Questions 5-8
Each question weighted equally.

1. Decision Rule: Students whose score on Grouping 2 is 75% to 99%.

   Prescription: To further your understanding of economic methodology, answer question 4 on page 12 of your textbook.

2. Decision Rule: Students whose score on Grouping 2 is from 50 through 74%.

   Prescription: Answer true-false questions 3, 4, 5 on page 5 of your Study Guide. After each question explain briefly why the statement is true or false.

3. Decision Rule: Students whose score on Grouping 2 is less than 50%.

   Prescription: Answer questions 1, 3, and 4 on page 7 of your Study Guide (Questions for Discussion).

Concept Area 3: Graphical Analysis

Question Grouping 3: Questions 9 - 12
Each question weighted equally.

1. Decision Rule: Students whose score on Grouping 3 is 100%.

   Prescription: Your understanding and interpretation of graphs will prove useful to you throughout this course.

2. Decision Rule: Students whose score on Grouping 3 is 0 through 75%.

   Prescription: Pick up the handout called ISM-1 (model building -- constructing and applying graphic models). After completing the independent study module at the Instructional Media Center, turn in Test 1 which accompanies the handout.

Concept Area 4: Pitfalls and Fallacies in Economics

Question Grouping 4: Questions 13-16
Each question weighted equally.

1. Decision Rule: Students whose score on Grouping 4 is 75% or above.

   Prescription: If you feel unsure about your understanding of fallacies and pitfalls in economic reasoning, review fill-in questions 11 through 18 in your Study Guide. (Optional)

2. Decision Rule: Students whose score on Grouping 4 is 50 through 74%.

   Prescription: Define and illustrate each of the fallacies listed in behavioral objective number 10, on page 7 of your Study Guide.

3. Decision Rule: Students whose score on Grouping 4 is less than 50%.

   Prescription: Answer questions 9, 10, 14, 16 and 20 on pages 12 and 13 of your textbook.

Concept Area 5: Economics and Economic Policy

Question Grouping 5: Questions 17 - 20
Each question weighted equally.

1. Decision Rule: Students whose score on Grouping 5 is 75% or above.

   Prescription: To further your understanding of economics and economic policy, complete question 4 on page 7 (Questions for Discussion) of your Study Guide. (Optional)

2. Decision Rule: Students whose score on Grouping 5 is less than 74%.

   Prescription: Distinguish between normative statements and positive statements in economics and give two examples of each. Why do policy issues involve both?

Composite Score on Survey 1

1. Decision Rule: The students who score 90% or above overall.

   Prescription: Your survey indicates that you have a firm grasp of the basic concepts presented thus far. Keep up the good work.

2. Decision Rule: Students whose composite score is less than 50%.

   Prescription: Your survey results reveal that you are having difficulty mastering the basic concepts of this course. Please see Professor Thompson if you are experiencing some difficulty for which he may provide assistance.

Class Message

Notice: Unless your assignments are designated "optional," the deadline for turning in the work prescribed is Wednesday, February 9 by the end of your class meeting.

Appendix E

TIPS
STUDENT PROGRESS REPORT
PRINCIPLES OF MACROECONOMICS (07)
PROFESSOR FRED A. THOMPSON

NOSHOW JOE
ID # 112308
SECTION # 51, 9:00 AM MWF
SECTION LEADER: MR. THOMPSON

SURVEY # 4 (02/28/77)
WEALTH AND INCOME DISTRIBUTION

OUR RECORDS INDICATE THAT YOU DID NOT TAKE THE SURVEY ON 02/28/77. AS A RESULT, AT THIS TIME WE DO NOT HAVE ANY DIRECT INDICATION OF YOUR UNDERSTANDING OF THE MATERIAL COVERED BY THIS SURVEY. IN THESE SITUATIONS, WE ASSIGN CERTAIN READINGS OR PROBLEMS WHICH ASSURE US THAT YOU ARE FAMILIAR WITH THE MINIMUM TOOLS NEEDED TO MASTER THIS ASPECT OF THE COURSE. THIS ASSIGNMENT IS NOT A PENALTY. RATHER, IT IS A MEANS OF ENSURING THAT WE HAVE PROVIDED YOU WITH THE TOOLS NEEDED TO MASTER MORE ADVANCED CONCEPTS.

ALL WRITTEN ASSIGNMENTS ARE TO BE HANDED IN FOR GRADING AT THE CLASS MEETING OF WEDNESDAY, MARCH 2.

WEALTH AND INCOME

--PICK UP THE HANDOUT CALLED ISM-27 (WEALTH, CAPITAL, AND INVESTMENT). AFTER COMPLETING THE INDEPENDENT STUDY MODULE AT THE INSTRUCTIONAL MEDIA CENTER, TURN IN TEST 27 WHICH ACCOMPANIES THE HANDOUT.

MEASURES OF INCOME DISTRIBUTION

--PICK UP THE HANDOUT CALLED ISM-28 (DISTRIBUTION OF INCOME). AFTER COMPLETING THIS INDEPENDENT STUDY MODULE AT THE INSTRUCTIONAL MEDIA CENTER, TURN IN TEST 28 WHICH ACCOMPANIES THE HANDOUT.

POVERTY AND INCOME REDISTRIBUTION

--ANSWER QUESTIONS 3 and 5 ON PAGE 289 OF YOUR STUDY GUIDE. BE SURE THAT YOU DESCRIBE AT LEAST THREE INCOME MAINTENANCE ALTERNATIVES TO WELFARE IN QUESTION 5.

NOTICE: THE FIRST HOUR EXAMINATION WILL BE HELD ON WEDNESDAY, MARCH 2 ON ALL MATERIAL TO DATE. PLEASE BRING A NO. 2 PENCIL. THE FIRST EXAM WILL CONSIST OF 40 MULTIPLE-CHOICE QUESTIONS. IF YOU HAVE KEPT UP WITH YOUR STUDYING BY ATTENDING CLASS, READING ASSIGNED MATERIALS, AND COMPLETING YOUR TIPS PRESCRIPTIONS, YOU SHOULD BE WELL-PREPARED.

Appendix F

TIPS
STUDENT PROGRESS REPORT
PRINCIPLES OF MACROECONOMICS (07)
PROFESSOR FRED A. THOMPSON

NOSTUDY NEVELLE
ID # 129185
SECTION # 51, 9:00 AM MWF
SECTION LEADER: MR. THOMPSON

SURVEY # 10 (04/29/77)
FED MONETARY CONTROLS

YOU CORRECTLY ANSWERED 7 OUT OF THE 15 QUESTIONS ON THIS SURVEY. THE FOLLOWING TABLE SUMMARIZES YOUR ANSWERS AS WELL AS THE CORRECT ANSWERS FOR THIS SURVEY. YOU ARE URGED TO MAKE SURE THAT YOU UNDERSTAND THE NATURE OF ANY INCORRECT RESPONSES WHICH YOU MADE.

T A B L E O F R E S P O N S E S

QUES. NUMB.	YOUR ANSW.	CORR. ANSW.	QUES. NUMB.	YOUR ANSW.	CORR. ANSW.	QUES. NUMB.	YOUR ANSW.	CORR. ANSW.
1.	2	1	6.	1	1	11.	1	4
2.	1	3	7.	4	3	12.	3	2
3.	4	1	8.	1	1	13.	4	3
4.	2	3	9.	3	3	14.	3	3
5.	3	3	10.	4	4	15.	1	1

ALL PRESCRIBED WRITTEN WORK IS TO BE COMPLETED AND TURNED IN FOR GRADING AT THE CLASS MEETING OF WEDNESDAY, MAY 4.

QUANTITATIVE CONTROLS OF THE FED

--PREPARE AND TURN IN WRITTEN ANSWERS TO BEHAVIORAL OBJECTIVES NO. 2 AND NO. 3 FOUND ON PAGE 131 OF YOUR STUDY GUIDE. (THESE OBJECTIVES DEAL WITH RESERVE REQUIREMENTS AND OPEN-MARKET OPERATIONS.)

QUALITATIVE CONTROLS OF THE FED

--YOU MISSED ONE QUESTION IN THE CONCEPT AREA OF QUALITATIVE MONETARY CONTROLS. REVIEW QUESTIONS SEVEN THROUGH NINE ON YOUR SURVEY AND TRY TO UNDERSTAND THE CORRECT RESPONSES.

MONETARY POLICY

--ANSWER TRUE-FALSE QUESTIONS NOS. 9,10,11 AND 12 ON PAGES 129 AND 130 OF YOUR STUDY GUIDE. AFTER EACH QUESTION, EXPLAIN BRIEFLY IN WRITING WHY THE STATEMENT IS TRUE OR FALSE.

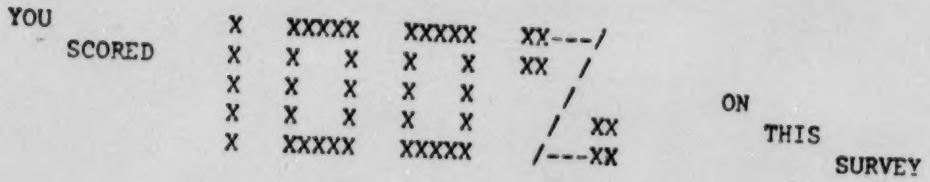
NOTICE: ALL STUDENTS WILL RETURN THEIR SURVEY 10 PRINTOUTS TOGETHER WITH ANY PRESCRIBED WRITTEN WORK ON WEDNESDAY, MAY 4 AT THE TIME OF YOUR CLASS MEETING. NO LATE WORK WILL BE GRADED OR ACCEPTED FOR CREDIT.

Appendix G

TIPS
STUDENT PROGRESS REPORT
PRINCIPLES OF MACROECONOMICS (07)
PROFESSOR FRED A. THOMPSON

SHARPE STUDENT
ID # 115686
SECTION # 53, 11:00 AM MWF
SECTION LEADER: MR. THOMPSON

SURVEY # 13 (05/27/77)
ECONOMIC GROWTH



FOR YOUR RECORDS, THE CORRECT ANSWERS FOR THE 12 QUESTIONS ON THIS SURVEY ARE 3 4 3 4 4 2 1 1 3 4 3 2

ALL WRITTEN ASSIGNMENTS ARE TO BE HANDED IN FOR GRADING AT THE CLASS MEETING OF FRIDAY, JUNE 3.

ECONOMIC GROWTH CONCEPTS

CLASSICAL GROWTH THEORY

U.S. ECONOMIC GROWTH

NOTICE: SURVEY 13 PRINTOUTS TOGETHER WITH ANY PRESCRIBED WRITTEN ASSIGNMENTS ARE TO BE TURNED IN ON FRIDAY, JUNE 3 FOR GRADING. NO LATE WORK WILL BE GRADED OR ACCEPTED FOR CREDIT.

TIPS
PROFESSOR'S SUMMARY REPORT

PRINCIPLES OF MACROECONOMICS (07)
PROFESSOR FRED A. THOMPSON

	CLASS
NUMBER OF STUDENTS	96
NUMBER TAKING TEST # 1 -- BASIC ECONOMIC CONCEPTS	93
NUMBER RECEIVING STUDENT REPORT # 01 -- BASIC ECONOMIC CONCEPTS	96

TABLE OF AVERAGE SCORES — AVERAGE PCT. CORRECT

FILE	LABEL	CLASS (N= 93)
G151 --	SURVEY 1: BASIC ECONOMIC CONCEPTS ALL 20 QUESTIONS ON THE TEST	76.8
G152 --	KNOWLEDGE OF TERMS AND DEFINITIONS QSTS 1,2,3,4	87.6
G153 --	ECONOMIC METHODOLOGY QSTS 5,6,7,8	63.7
G154 --	GRAPHICAL ANALYSIS QSTS 9,10,11,12	81.7
G155 --	PITFALLS AND FALLACIES QSTS 13,14,15,16	79.6
G156 --	ECONOMICS AND ECONOMIC POLICY QSTS 17,18,19,20	71.2

ITEM ANALYSIS TABLE

NO.	ANS.	PERCENT CORRECT	PERCENT IN CLASS SELECTING ALTERNATIVE RESPONSES					
		CLASS (N= 93)	1	2	3	4	5	NO RESP.
1	3	98	0	1	98	0	0	1
2	3	98	1	1	98	0	0	0
3	3	90	0	0	90	2	0	0
4	2	65	3	65	14	17	0	1
5	1	68	68	15	15	1	1	0
6	1	33	33	3	4	59	0	0
7	1	56	56	28	15	1	0	0
8	1	98	98	0	2	0	0	0
9	2	68	22	68	1	9	0	1
10	1	80	80	14	1	5	0	0
11	2	95	2	95	1	2	0	0
12	2	85	5	85	8	2	0	0
13	2	84	9	84	3	3	0	1
14	1	88	88	2	2	8	0	0
15	4	88	2	4	5	88	0	0
16	4	58	82	1	9	58	0	0
17	2	86	4	86	4	5	0	0
18	3	60	12	9	60	19	0	0
19	2	55	16	55	26	3	0	0
20	2	84	4	84	10	2	0	0